

Star Movement Is Not Predicted Two-Compartment Model of the Universe

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Abstract

A two-compartment model of the universe is proposed to further refine Albert Einstein's insight into curvature of space and the energy tensor. The two compartments are energy contained by a shell prism. The model allows for a non-unification of fundamental forces with gravity resulting from the curvature of a space-time prism. Carrier forces travel within the prism and particles emerge from the prism. Giving a thickness to the manifold negates infinity and will allow solutions at both microscopic and cosmic levels. Geometry is the link between quantum mechanics and general relativity. Negative entropy, as proposed by Erwin Schrödinger, gives order to particles and the cosmic. The source of this energy is in the shell of the containment vessel. The acceleration of the expansion of the universe occurred when energy within the container transformed into mass, warping the space-time container and causing an explosion of the container. Star movement is explained by the surface tension of the prism of space-time.

Keywords

Two-Compartment Model, Negative Entropy, Geometry

1. Introduction

Star movement in galaxies is a perplexing issue, just as the precession of Mercury around the Sun. Dark matter is an invoked explanation for the movement of stars but has not been detected [1]-[5]. XENONnT's upgrade of XENON1 with all of the tedious improvements in sensitivity has not confirmed weakly interactive massive particles [6]. The quantum world and classical observations seem disparate [7]. Einstein's equations [8] [9] describing gravity wells need revision if dark matter is never confirmed. The acceleration of the expansion of the universe is unexplained.

Fundamentals suggest a new view, new concepts of entropy, advancements in math, and refined general relativity equations are needed to reconcile these issues. Euclid, in 300 BC, defined the geometry of planes and solids. In the 1800s, new math was conceived to justify the concept that parallel lines could intersect on a curved surface. Riemann, in 1854, formalized geometry of manifolds [10], the keystone underlying Einstein's equations relating acceleration of gravity to mass-deforming geometry. Riemann manifolds allow the structure of infinity that can be imagined but not realized in the physical world. Manifolds are a construct that needs to be updated to better represent the physical world, both macroscopic and microscopic. Quantum mechanics and space-time need unification by geometry.

2. Proposal

The proposed new construct would investigate the structure of space-time as parallel manifolds, specialized prism, of thickness t , perhaps, Planck's length $1.616255(18) \times 10^{-35}$ m [11]. This distance is chosen as the smallest distance allowed. The initial construct considers t to be a constant thickness. Future considerations may allow for a variable thickness t , or a process-dependent changing thickness. The prism construct negates the concept of infinity since the manifolds are separated by at least $2t$. In the following equation $1/[X]$, x cannot approach zero only to the distance of $+t-t$. $1/2t$ is still a very large number but is not infinity (Figure 1).

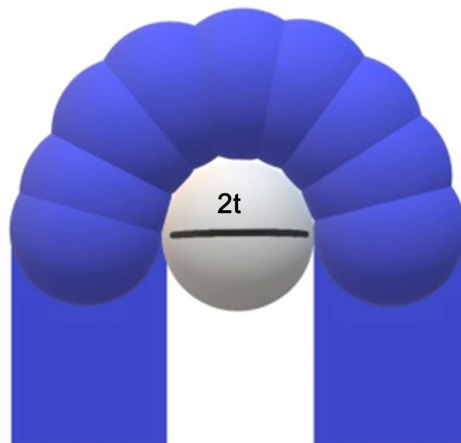


Figure 1. Proposed folding of space-time prism at inflection.

Adding thickness to space-time increases the number of dimensions from four to five. This concept has previously been proposed by Kaluza and Klein [12] [13]. The equations of motion with the fifth dimension allowed electromagnetic fields. This early concept was the seed for String Theory advancing to 11 dimensions attempting to incorporate gravity into a unified theory of everything [14].

The volumetric shape between $-t$ and $+t$ requires new math and will re-write Einstein's general theory of relativity having solutions at the inflection point. Ripples in the prism at the inflection are noted in Figure 1. These ripples represent

quantum geometry of spheres, geometry producing wave functions or as some describe as strings, constructed by the prism. Spheres are the conjectured natural choice to support wave theory. The spheres contain energy. They are small with different radii, so when combined, they provide the wave functions of 16 fundamental particles (**Figure 2**).

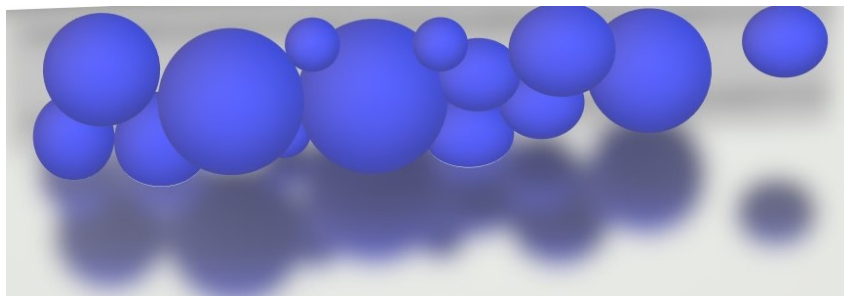


Figure 2. Spherical composition of space-time prism.

Riemann cautioned in the microscopic curved space, his geometric description could breakdown. The geometry of tiny overlapping spheres or variable-sized discreet spheres of the microscopic will generate the source of field equations. The observer and the environment, according to Everett's interpretation [15] will be replaced by the prism of space-time. Probability waves exist within space-time prism and the emerging particles are observed out of space-time. Space-time entangles particles, not the bystander observer or the environment. There is only one world in this new construct. All probabilities exist within space-time and emerge into reality when particles exit space-time.

The geometry of the prism at the inflection point will reveal the structure of black holes, the fabric, the beginning, and the future of the universe (**Figure 1**). The geometry at the inflection depends on the properties of the prism. The prism has 2 faces, no edges and no vertices. The structure satisfies Euler's equation and is better described as a membrane than a solid. The properties of this membrane prism relating energy to mass transformation are yet to be described and encoded in the geometry of microscopic. Possible properties include compressible versus non-compressible, surface tension interacting with mass, viscosity, elasticity, and special properties related to mass membrane, energy interactions, *i.e.* the process of converting energy into mass, mass into energy and the energy ($-$ entropy) allowing order to evolve defined by overlapping or discreet spheres. The membrane provides order to the universe's structure. The special properties of the prism will unite quantum mechanics, energy/mass equivalence, fundamental forces of strong, weak, electromagnetic, and gravity through considerations of two processes, one within the geometry of the prism and the other inside a containment vessel, the space within the prism.

Conjectures about the state of the universe before the big bang are necessary to understand the conversion of energy to mass, the structure of the universe, and ultimately answer the question of movement of stars in galaxies. The conjecture

is the space-time prism was a containment vessel of energy and quantum fields determined by the geometry of the prism (**Figure 3**). The vast amount of energy within this vessel fails description since energy is only realized when work is completed. Entropy, the ruler of order/disorder is the architect transforming energy to structure. Entropy has been defined in terms of temperature by Boltzmann and is used to explain heat engine efficiency. Temperature is a difficult concept representing a change in energy. Every 1° K change of thermodynamic temperature corresponds to a thermal energy change of exactly 1.380649×10^{-23} J.

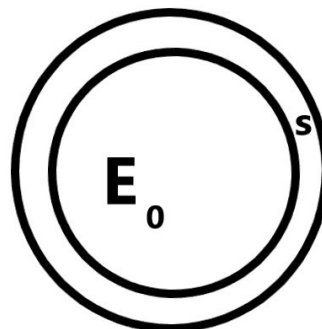


Figure 3. Energy of the universe $E_0 + S$, whereas E_0 = energy of creation, S = entropic energy of prism.

3. Negative Entropy

Erwin Schrödinger was a famous early 20th century physicist who first proposed the concept of negative entropy explaining the ordering of life. He is more famously one of the founders of quantum mechanics and the wave equation. He also conjectured the existence of a memory molecule that preserves life's information from one generation to the next. Erwin Schrödinger (1944) [16], "What Is Life? The Physical Aspect of the Living Cell". The excerpt below is based on lectures delivered under the auspices of the Dublin Institute for Advanced Studies at Trinity College, Dublin, in February 1943.

"How would we express in terms of the statistical theory the marvelous faculty of a living organism, by which it delays the decay into thermodynamic equilibrium (death)? We said before: 'It feeds upon negative entropy', attracting, as it were, a stream of negative entropy upon itself, to compensate for the entropy increase, it produces by living and thus to maintain itself on a stationary and fairly low entropy level. If D is a measure of disorder, its reciprocal, $1/D$, can be regarded as a direct measure of order. Since the logarithm of $1/D$ is just minus the logarithm of D , we can write Boltzmann's equation thus:

$$-(\text{entropy}) = k \log(1/D)$$

Hence, the awkward expression 'negative entropy' can be replaced by a better one: entropy, taken with the negative sign, is itself a measure of order. Thus, the device by which an organism maintains itself stationary at a fairly high level of orderliness (= fairly low level of entropy) really consists of continually sucking orderliness from

its environment. This conclusion is less paradoxical than it appears at first sight. Rather could it be blamed for triviality? Indeed, in the case of higher animals, we know the kind of orderliness they feed upon well enough, viz. the extremely well-ordered state of matter in more or less complicated organic compounds, which serve them as foodstuffs. After utilizing it, they return it in a very much degraded form—not entirely degraded, however, for plants can still make use of it. (These, of course, have their most power supply of ‘negative entropy’ in the sunlight.)

$$\text{Entropy} = k \log D,$$

where k is the so-called Boltzmann’s constant $= (3.2983 \times 10^{24} \text{ cal./}^\circ\text{C})$, and D is a quantitative measure of the atomistic disorder of the body in question” [16].

In biology, carrier proteins assure the probability of an outcome. These carriers are responsible for Erwin Schrödinger’s ordering of life. They ensure that the lowest energy-requiring step has the highest probability for the desired next outcome in biological systems. Eventually, disorder wins, and the biological system deteriorates with age [17] [18]. In the universe, the particles produced during the conversion of energy to mass are guided by entropic energy incorporated in the space-time prism (–entropy). The system with energy E has increasing entropy, but the ordering of the particles is determined by the energy S of the prism, which loses energy into the containment vessel.

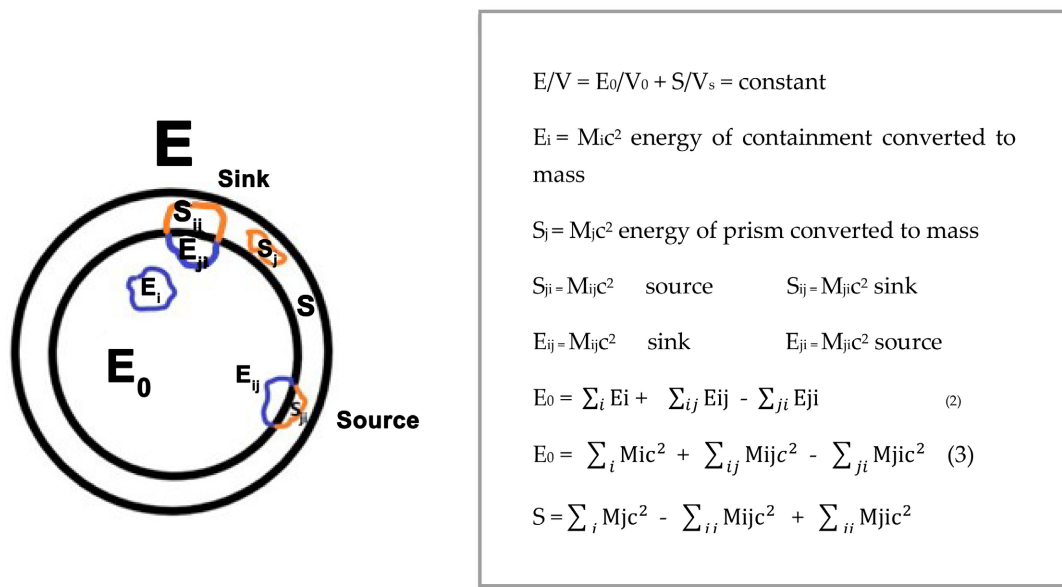


Figure 4. Energy mass conversions in the containment vessel and prism.

As shown in Figure 4, energy is distributed over the volume of the container and the volume of the shell. Equations of energy mass transformation need to be expressed as energy per volume. Energy within the container is a combination of energy and mass that has been created by entropic energy emanating from the shell. Therefore, fluxes of energy conversion to mass and mass to energy are represented by both sinks and sources of the prism. This concept differs from the current early

theories of the early universe [19]. The universe did not spring from nothing but from a highly energetic containment vessel that exploded when the mass-energy conversion reached a critical limit. Mass was created before the big bang and was a contributor to the rupture of the prism. As mass was created, space-time began to warp, eventually exceeding the stress tolerance of the membrane. Black holes therefore can exist at the time of the big bang [20].

4. Geometry

$$E/V = 3\sum_i M_i c^2 / 4\pi r^3 + 3\sum_j M_j c^2 / 4\pi(t^3 + 3rt^2 + 3r^2t) = \text{constant}$$

Energy flux is the derivative E/V with respect to area $4\pi r^2$ is zero.

$$\text{Therefore, } \sum_i M_i / r^3 = -\sum_j M_j / (t^3 + 3rt^2 + 3r^2t),$$

$\sum_i M_i / \sum_j M_j = -(t^3 + 3rt^2 + 3r^2t) / r^3$, order/disorder is now expressed as geometry.

The geometry of the prism container may be simple or complex. The simple geometry is a sphere that has a volume of $4/3\pi R^3$. The shell will have a volume of $4/3\pi(t^3 + 3Rt^2 + 3tR^2)$. As mass forms in space the geometry of the sphere will be altered. Perhaps, there may be buds extruding from the sphere, increasing the volume of the shell. The geometry will ultimately be determined by mass/energy conversions warping the sphere. The microscopic geometry of the shell to accommodate for ripples and generation of wave function is proposed as a collection of energy spheres with the most efficient use of volume.

At the inflection points, in order to maintain a $2t$ distance, the surfaces of the prism are wrinkled, as illustrated in **Figure 1**. In areas of minimal change, the prism will appear flat but, on the microscopic, will exhibit spherical fluctuations. The structure generates waves. These waves and buds (possible reaction chambers that convert energy into mass) generate strings and particles from the microscopic to the cosmic. Gravity, before the big bang did not exist since mass deforming the prism did not exist. As the conversion from energy to mass begins, the geometry of the container will change and gravity will emerge from the changing curvature. On the cosmic scale, the inflection point in black holes is shaped by mass-deforming gravity and is also limited by these same properties. The geometry of the center of black holes acts in reverse, converting mass back into energy. Information is not lost in black holes only converted.

The Boltzmann equation was derived from identical particles in a closed chamber, demonstrating how the speeds of the molecules with different energies are distributed for an ideal gas. There was no ordering for this process, so the total entropy is disorder. This idealized simple format needs revision to include properties of negative entropy. This formula will determine the energy-to-mass conversion, including properties of spin, angular momentum, mass, charge, and anti-particle versus particle ratio.

Considering the universe before the big bang the space-time prism contained

the energy with particles being formed according to the quantum field probability guided by the fine geometry and entropic energy of the space-time prism. Seventeen particles or rather reduced to 16 by incorporating the Higgs and the Higgs field, the gauge bosons gluons, photons, W and Z bosons and their fields into the space-time prism. Forces and matter are separated and allowed to react at the interface of the prism. The developing mass began to deform the prism. The separation of Higgs and force particles allows for the duality of photons, appearing as a particle outside of the prism and wavelike within the prism. Further characterization of the 16 particles by spin and color results in 48 particles. Thirty-six Quarks and 12 leptons are characterized by spin and color, making up fermions. The question is the carrier geometry that favors these 48 particles (**Figure 2**).

Before the universe, there was no mass, only energy encased in a space-time prism. The membrane acts as a conversion medium from energy to mass, energy per unit of surface area flux. It also has entropic functions to favor order over chaos. The total energy of the universe is a combination of energy contained within the prism that will eventually be converted into mass, plus the entropic energy contained within the shell that assures an orderly process. Temperature is not defined since there is no flow of energy until conversion to mass and rupture of the container.

5. Dark Matter and Dark Energy

Theoretical physicists have contributed immensely to our knowledge of reality [21]-[24]. In order to explain concepts of star movement and expansion of the universe, they have strong mathematical formulations enabling predictions. Experimental evidence, however, is difficult to confirm these predictions. The two-compartment model of the universe should be in agreement with those achievements. Both dark energy and dark mass are contained within the prism of space-time. Geometry-determined gravity will simplify theoretical concepts by separating electromagnetic, strong, and the weak from the acceleration of gravity.

6. New Equation

On larger scales, Einstein's equation predicts the precession of Mercury but fails to explain why stars move at constant velocities in galaxies. A rotating space-time prism operating through the force of surface tension will carry stars at the same velocity as the rotation of the space-time prism. Rotation of space-time is not allowed (no torsion); however, rotating space-time without torsion is allowed; covariance is satisfied. Proposed models must explain the beginning of the universe, predict its structure, demonstrate the process of energy conversion to fundamental particles, and predict the future.

The conversion of energy is therefore ordered, designed to favor matter over antimatter, assuring structure of the universe. At the time of the "big bang" energy mass conversions allowed mass production to overwhelm entropic energy, causing failure of the containment vessel. The flow of energy and mass raised the temperature rupturing the container. The structure of the universe looks similar to a

balloon explosion in slow motion, shreds of the container form galaxy-forming filaments. Segments of space-time propelled by the big bang flew into the external environment, rotating and explaining the movement of stars in galaxies, tethering the stars by surface tension of the prism. Unlike the balloon analogy, there is no resistance to slow the expansion after the impulse, and acceleration is preserved. The universe is expanding into the best description of nothing.

Einstein's equations have Tensors describing forces in 4 dimensions (x_0, x_1, x_2, x_3). The new math of parallel manifolds will replace Riemann manifold with curved prism reflected by a fifth-order Tensor. The force Tensor will also need to be a fifth order (time), 3 dimensions of space, and the thickness of the space-time prism (x_0, x_1, x_2, x_3, x_4). The previous 16 equations were reduced to 10 because identical equations will now be represented by 25 equations also reduced by similarities.

$$\begin{array}{cccccc}
 & & T_{00} & T_{01} & T_{02} & T_{03} & T_{04} \\
 & & T_{10} & T_{11} & T_{12} & T_{13} & T_{14} \\
 T_{\mu\nu t} & = & T_{20} & T_{21} & T_{22} & T_{23} & T_{24} \\
 & & T_{30} & T_{31} & T_{32} & T_{33} & T_{34} \\
 & & T_{40} & T_{41} & T_{42} & T_{43} & T_{44}
 \end{array}$$

The additional force equations will identify properties of space-time prism, including surface tension and viscosity. Mass-deforming geometry will still determine the acceleration of gravity. The geometry of the prism also determines the production and quantum nature of fundamental particles. The additional equations will now accurately describe the motion of stars in galaxies and predict the future fate of the universe relative to energy mass conversions. If the equations are valid and solvable for all orders of magnitude, solutions to the microscopic and macroscopic will be valid. A two-compartment model of the universe will unite all of the forces of nature.

T_{00}	energy density in space
$T_{01} T_{02} T_{03}$	energy flux in space
T_{04}	energy flux in the shell
$T_{10} T_{20} T_{30}$	momentum density energy flowing thru space
T_{40}	energy density in the shell
$T_{11} T_{22} T_{33}$	pressure in space
T_{44}	energy of the shell (prism)
$T_{12} T_{13} T_{23}$	shear stress in space
$T_{21} T_{31} T_{32}$	shear stress in space
$T_{14} T_{24} T_{34}$	viscosity shear stress in shell
$T_{41} T_{42} T_{43}$	viscosity shear stress in shell

$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} + \Lambda g_{\mu\nu} = \kappa T_{\mu\nu}$$

$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} = \kappa T_{\mu\nu}$$

2 compartment equation

The cosmological constant can be set to zero when considering movement of stars in galaxies. The correction factor should no longer be required. Surface tension $T = \frac{F}{L}$ is used to explain movement of stars without invoking dark forces, dark energy or dark mass. The cosmological constant can be ignored in smaller dimensions and is not needed at larger dimensions with the addition of a second compartment of energy. The equations which were difficult to solve before a proposed change in geometry have now become more complex. Unification theory does not need gravitons as an explanation. Geometry and mass effect on geometry unite the quantum with the cosmological. Curvature in the microscopic must be solved to be consistent with quantum mechanics.

The parallel manifolds can unite quantum mechanics and gravity by realizing particles can be waves inside the space-time prism and emerge as particles outside of the prism. Superposition is explained by measurements of particles that can only occur outside the space-time prism. Probability wave functions exist within the prism. The speed of light is constant outside of space-time. Information is nearly instantaneous within space-time prism, with information only traveling the thickness of the prism. Entanglement is “spooky at a distance”, particles may be separated in space but never farther than the thickness of space-time prism. Entanglement is predicted not to be instantaneous but separated by the calculated time t/c .

7. Conclusions

Failure to demonstrate the existence of dark matter explaining the movement of stars in the Galaxy and failure of a unified theory into a single fundamental force invoking gravitons requires a new method. The proposed method of unifying particle physics with general relativity lies within geometry, adding another dimension to space-time—thickness. Erwin Schrödinger’s interest in life and negative entropy assuring order out of disorder is provided by the new geometry. The energy of negative entropy is supplied from the space-time prism. Einstein’s brilliant understanding of the universe related to geometry was an approximation. The real geometry of space-time also includes thickness, making it a membrane instead of an imaginary surface. The universe is a two-compartment model.

The energy in space-time prism is the entropic energy ordering the structure of mass on microscopic level and the structure of the universe on the macroscopic. Mass has the property of distorting space-time during creation and the ultimate structure of the universe. Inflection points can no longer be infinite but will have to obey the properties of space-time. Curvature invokes periodic ripples provided by spheres in space-time. The periodic ripples can be translated to wave theory

obeying quantum mechanics.

Geometry-mass interactions, as predicted by a 5-dimensional tensor, explain the movement of stars and will be necessary to understand energy-to-mass conversions. The continued acceleration of the universe implies the containment vessel ruptured into nothing, impeding its progress. The conception is straightforward; the mathematics is relegated to the brilliant.

8. Caveat

The author is a self-declared physicist 2 months into retirement after 50 years of cardiology. My apologies and appreciation are expressed to real physicists who do the hard lifting. Hopefully, after intense criticism, they will support the two-compartment model and supply the necessary supporting math. Imagination proceeds theory followed by mathematical confirmation.

Refinement of negative entropy is especially applicable to biology and fundamental particles.

Early appearance of black holes.

Only one reality.

What will the 25 differential equations tell us about the beginning and fate of the universe?

Two-compartment models allow a cyclic universe.

All solutions are finite.

Into what is the universe accelerating?

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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